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JAN MCLIN CLAYBERG
PATENT AND TECHNICAL TRANSLATION

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ACCREDITED BY AMERICAN TRANSLATORS ASSOCIATION
• GERMAN AND FRENCH TO ENGLISH
•• ENGLISH TO GERMAN

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DECLARATION

The undersigned, Olaf Bexhoeft, hereby states that he is well acquainted with both the English and German languages and that the attached is a true translation to the best of his knowledge and ability of the German text of PCT/DE03/00675, filed 02/28/2003 and published 09/12/2003 under No. WO 03/074401 A1, of two amended pages of spec. and of a set of twelve (12) amended claims.

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

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Specification

Cutting Device

The invention relates to a cutting device in accordance with the preamble of claims 1, 2 or 6.

Such a cutting device is employed, for example, for separating paper webs imprinted on a web-fed rotary printing press into individual signatures.

DE 26 17 000 C2 and AT 222 671 show cylinders with cutters and spur devices which, together with counter cylinders, form a single cutting gap.

DE 35 27 710 A1 discloses a folding apparatus, wherein two folding blade cylinders act together with a folding jaw cylinder. Each folding blade cylinder is fed its own web.

The object of the invention is based on providing a cutting device.

In accordance with the invention, this object is attained by means of the characteristics of claims 1, 2 or 6.

The advantages to be gained by means of the invention lie in particular in that the cutting device removes the danger of cutting already separated signatures again during another passage through a cutting gap, without requiring elaborate displacement devices or an uncommonly great precision of the control of the rotations of the individual cylinders of the cutting device. Since the cutting cylinder in the cutting device also takes on the function of a conveying cylinder for separated products, as long as a single signature is held on the cutting or conveying cylinder, it is located between the two cutter blades by which it

had been cut, and it is sufficient that during this time the cutting blades and the signature do not move in respect to each other, in order to assure that during another passage through a cutting gap the signature is not again cut.

A spur strip in particular can be used as a holding device. A counter-cylinder required as a backstop for the cutting blades of the cutting cylinder during cutting can then advantageously be equipped with at least one recess for receiving the spur needles supported on the spur strip.

Another advantage of the cutting device lies in particular in that it makes possible the joining of two webs of material, which are fed to the conveying cylinder on two conveying paths, into a common product, or that it permits the processing of a very large number of layers by the joining of two partial webs. In this way it is possible to create products with a high number of pages twice as fast as during collection operation and when using a single cutting gap.

Exemplary embodiments of the invention are represented in the drawings and will be described in greater detail in what follows.

Shown are in:

Fig. 1, a schematic lateral view of a folding apparatus with a cutting device,

Fig. 2, an enlarged representation of a detail from Fig. 1,

Fig. 3, a representation of a mode of operation,

Fig. 4, a representation of another mode of operation.

A schematic lateral view of a folding apparatus is represented in Fig. 1. This folding apparatus has two inlets 01, 02 for multi-layered webs 03, 04 of material, in particular paper webs 03, 04, which will be identified as the inner or outer web

03, 04 in what follows. Both webs 03, 04 pass through a respective pair of traction rollers 06, 07 for setting their tension and encounter a cutting and conveying cylinder 11 respectively at the height of cutting gaps 08, 09 between the cutting and conveying cylinder 11 on the one hand, and one of two counter-cylinders 12, 13 on the other hand. In place of two inlets 01, 02 and two cutting gaps 08, 09, it is also possible to provide three or more. In the course of this the webs 03, 04 preferably first come into contact with the respective counter-cylinder 12, 13, and thereafter with the cutting and conveying cylinder 11, i.e. the webs first loop around the counter cylinder 12, 13 and then around the cutting and conveying cylinder 11.

The circumference of the cutting and conveying cylinder 11 corresponds to more than five, preferably seven lengths of the signature. It supports more than five, preferably seven cutting blades evenly distributed over its circumference, and a holding device 16, for example a spur strip 16, located closely behind each cutting blade 14 in its movement direction (rotation in a counterclockwise direction in Fig. 1). Such a spur strip 16, which can be pivoted around a shaft 22 and supports spur needles 23, is shown enlarged in Fig. 2 at the moment of its passage through the cutting gap 08 at the counter-cylinder 12.

Each one of the identically constructed counter-cylinders 12 or 13 has a circumference corresponding to at least one, preferably two lengths of the signatures to be produced from the webs 03, 04. It supports at least one, preferably two counter-cutting strips cut into its circumferential surface, for example hard rubber strips, which are used as backstops 15 for the cutting blades 14 when cutting the webs 03 or 04, as well as a groove 24 located directly behind each backstop 15 in the movement direction

for receiving the tips of the spur needles 23 of the spur strip 16 which, during the passage through the cutting gap 08 or 09, are extended over the circumference of the cutting and conveying cylinder 11.

In the position represented in Fig. 1, a cutting blade 14 of the cutting and conveying cylinder 11 and a backstop 15 of the counter-cylinder 12 are just passing through the cutting gap 08 and in the process cut the inner web 03. The leading edge of the inner web 03 created by the cut is spiked on the spur needles 23 of a spur strip 16, which had been extended briefly prior to reaching the cutting gap 08 and which also fixedly hold it on the surface of the cutting and conveying cylinder 11 during further conveying.

The signature cut off the inner web 03 in this way is conveyed on at the cutting and conveying cylinder 11 to the cutting gap 09, where the outer web 04 is placed on top of it, is also spiked by the spur needles 23 of the spur strip 16 and is cut by the same cutting blade 14. Since between the passage through the cutting gap 08 and the passage through the cutting gap 09 the cutting blades 14 and the spur strips 16 did not move in relation to the cutting and conveying cylinder 11, there is no danger that the signatures cut from the web 03 in the cutting gap 08 are again cut during the passage through the cutting gap 09.

At the location of the cutting gaps 08 and 09, the tips of the spur needles 23 (see Fig. 2) extend farther past the circumference of the cutting and conveying cylinder 11 than the cutting blades 14, in order to assure that they have already been pushed through the web 03 or 04 before the latter are cut by the cutting blade 14.

In the example represented here, the angular distance between the two cutting gaps 08, 09 is approximately 50°. This angular distance can differ from the angular distance of the spur strips 16 from each other (51.5°) or a multiple thereof, so that cutting is not performed simultaneously at both cutting gaps 08, 09; a half-integral multiple of this value is also disadvantageous from the viewpoint of vibration avoidance.

Following the passage through the cutting gap 09, each spur strip 16 supports a whole product respectively composed of signatures cut off the inner web 03 and signatures cut off the outer web 04. Seven signatures are created in the course of every revolution of the cutting and conveying cylinder 11 in the same way as if both webs 03, 04 were fed via a common inlet in the customary way. However, since the cutting of each individual signature is spaced over to two cutting steps at the gaps 08, 09, the force to be provided in each cutting step is less, a satisfactory synchronous running of the machine is easier to maintain and the demands made on the mechanical stress capability of the cutting device are also less than in case of feeding through one common inlet.

Furthermore, at least five, preferable seven folding blades, not represented, are attached to the cutting and conveying cylinder 11, each of which is extended when reaching a gap 17 between the cutting and conveying cylinder 11 and a folding jaw cylinder 18 in order to transfer the products conveyed by the cutting and conveying cylinder 11 to the folding jaw cylinder 18 in a manner known per se, and to fold them. The folded products are transferred from the folding jaw cylinder 18 to a bucket wheel 19 and are deposited by the latter on a conveyor belt 21.

The modified embodiment of the cutting device differs from the one represented in Fig. 1 in that it has only a single inlet 02 for a single web 04 to be cut. For its description, reference is made to Fig. 1, wherein the inlet 01, the web 03 and the counter-cylinder 12 are assumed not to exist.

The web 04, fed in at the inlet 02 and having alternating patterns C and D, for example an imprinted web 04, meets the cutting and conveying cylinder 11 at the cutting gap 09, whose spur strips 18, when entering the cutting gap 09, alternatingly carry a signature with the pattern C, which was previously cut off the web 04, or no signature. Since the number of spur strips 16 is odd, at the cutting gap 09 an empty spur strip 16 respectively meets a pattern C of the web 04, and a spur strip 16 equipped with a signature with the pattern D of the web 04. Since the cutting blades 16 are rigidly fastened on the cutting and conveying cylinder 11, and the spur strips 16 do not move in relation to the cutting and conveying cylinder 11 between the first passage through the cutting gap 09, where they are loaded with the signature with the pattern C, and the second passage, there is no danger that the signatures with the pattern C are again cut during the second passage through the cutting gap 09.

Every time a spur strip 16 equipped with two signatures C and D passes through the gap 17, the total product obtained in this way is transferred in a manner known per se to the folding jaw cylinder 18.

In all modes of operation, a further conveying cylinder for taking over the signatures can be connected downstream, instead of the folding jaw cylinder 18, downstream of which a folding jaw cylinder or a belt system can be arranged.

It is also possible for each of the webs 03, 04 to have the same patterns A or B located one behind the other, i.e. in the conveying direction. Preferably these patterns A and B are imprinted by means of at least one forme cylinder of a printing unit, which has two identical patterns A and B on its circumference. The webs 03, 04 are guided on top of each other, so that signatures with patterns A and B located on top of each other are created, each of which is transferred to the downstream located folding jaw cylinder 18 in the gap 17. The cutting and conveying cylinder 11 does not absolutely have to have an odd-numbered division, but instead can also have an even-numbered division, preferably greater than 4 or 6.

Preferably, each of the patterns A, B, C, D identifies two newspaper pages, wherein A1, A2, B1, B2, C1, C2, D1, D2 each identify a newspaper page.

The identification 03, 04 is understood to represent at least one web 03, 04, but preferably should be understood to be a strand consisting of several webs 03, 04 placed on top of each other.

Here, the webs 03, 04 can each be imprinted by means of forme cylinders of printing units, which either have a pattern A or B on the circumference (single circumference), or two patterns A or B on the circumference (double circumference). With double circumference forme cylinders, two identical patterns A, A, or B, B, or two different patterns A, B can be arranged on the circumference.

Therefore four modes of operation are possible.

In a first and second mode of operation, both webs 03, 04 are brought together on the cutting and conveying cylinder 11

ahead of the first inlet 01, 02 and are severed in the course of a single cutting operation.

In this case, in a first mode of operation the webs 03, 04 have identical patterns A or C in sequence, and the same products are formed sequentially on the cutting and conveying cylinder 11 during each revolution and are directly transferred to the downstream located folding jaw cylinder 18.

In a second mode of operation, the webs 03, 04 have patterns A, B or C, D, which alternate behind each other and which are alternatingly deposited on the cutting and conveying cylinder 11 during a first revolution of the cutting and conveying cylinder 11, which is provided with an odd number of fields (= collection cylinder), and are additionally provided with a second layer of the folding product portion during the second revolution.

In a third and fourth mode of operation, two webs 03, 04 are separately fed in, wherein in the third mode of operation the webs 03, 04 alternatingly bear the patterns A, B or C, D located one behind the other.

In this case, during a first revolution of the cutting and conveying cylinder 11 (= collection cylinder), first signatures with the pattern A, C of each web 03, 04 are conducted on all and every second spur strip 16, so that now every second spur strip 16 carries a signature with the pattern A, C, and during the second revolution again two signatures with the pattern B, D from each web 03, 04 are conducted on the spur strips 16.

Therefore, during the second revolution of the cutting and conveying cylinder 11, signatures A, C, B, D on the spur strips 16 alternate with spur strips 16 carrying only signatures with the patterns A, C, wherein the signatures, i.e. the product with the

pattern A, B, C, D of each second field, are transferred to the folding jaw cylinder 18.

In a fourth mode of operation, the webs 03, 04 have identical patterns A, A, or C, C located behind each other, so that with each revolution of the cutting and conveying cylinder 11 each spur strip 16 carries signatures with the pattern A, C, which are directly transferred to the folding jaw cylinder 18 when they arrive there.

List of Reference Symbols

01	Inlet
02	Inlet
03	Web of material, paper web, inner web
04	Web of material, paper web, outer web
05	-
06	Traction roller pair
07	Traction roller pair
08	Cutting gap
09	Cutting gap
10	-
11	Cutting and conveying cylinder
12	Counter-cylinder
13	Counter-cylinder
14	Cutting blade
15	Backstop
16	Holding device, spur strip
17	Gap
18	Folding jaw cylinder
19	Bucket wheel
20	-
21	Conveyor belt
22	Shaft
23	Spur needles
24	Groove
A	Pattern, signature with pattern, product with pattern

B	Pattern, signature with pattern, product with pattern
C	Pattern, signature with pattern, product with pattern
D	Pattern, signature with pattern, product with pattern